

***United States Court of Appeals  
for the Second Circuit***

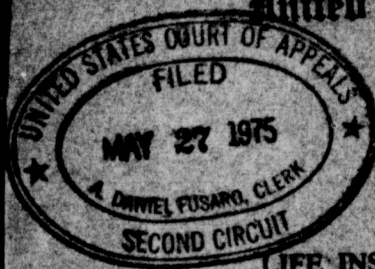


**APPELLEE'S BRIEF**





# 74-1629-1632



## United States Court of Appeals

For the Second Circuit

Nos. 74-1629 & 74-1632

HELLENIC LINES LIMITED,

*Plaintiff-Appellant,*

—against—

LIFE INSURANCE CORPORATION OF INDIA,

*Defendant-Appellee.*

HELLENIC LINES LIMITED,

*Plaintiff-Appellant,*

—against—

AETNA CASUALTY & SURETY COMPANY, *et al.*,

*Defendants-Appellees.*

ON APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES  
FOR THE SOUTHERN DISTRICT OF NEW YORK

### BRIEF FOR DEFENDANT-APPELLEES, LIFE INSURANCE CORPORATION OF INDIA, AETNA CASUALTY & SURETY COMPANY *et al.*,

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**ON APPEAL FROM THE DISTRICT COURT OF THE  
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**BRIEF FOR DEFENDANT-APPELLEES, LIFE  
INSURANCE CORPORATION OF INDIA,  
AETNA CASUALTY & SURETY  
COMPANY et al.,**

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**Statement**

These are consolidated cases brought by plaintiff-appellant (Hellenic) owner of the SS HELLENIC SAILOR against various cargo insurers (cargo) to recover contributions said to be due in general average. Cargo defended on the ground that Hellenic had failed to exercise due diligence at

and before the beginning of the voyage to make the vessel seaworthy, especially with respect to its crankshaft, and that as a consequence expenses incurred by Hellenic during the voyage after the crankshaft fractured were not recoverable from cargo.

The case was heard by the District Court, Judge Griesa, sitting without a jury. The proceeding lasted some eight days during which time ten witnesses were heard, numerous exhibits were received in evidence and excerpts of depositions were offered.

The questions involved were highly technical in nature and, as the court stated in its opinion, concerned tolerances which were "... to a layman, usually very tiny ..." (591a). Nevertheless, unless the alignment of a vessel's main engine crankshaft is kept within these tolerances, the additional stresses caused thereby will bring about serious engine damage. Illustrative of the necessity of the close attention required in aligning a main engine crankshaft, is the fine adjustment made in the shaft by Hellenic after it was repaired at Bombay. Measurements taken at that time by Hellenic's Chief Engineer disclosed that the shaft had a sag of .000 in. at No. 4 main bearing, .001 in. at No. 3 main bearing and .002 in. at No. 2 main bearing. This alignment was deemed unacceptable and the main bearings were adjusted to increase the crankshaft sag to .003 in. at No. 4 main bearing, .004 in. at No. 3 main bearing and .004 in. at No. 2 main bearing (663a, 664a; Def. Ex. Q—marked for identification at deposition as Def. Ex. 15 F). The corrections involved a difference of between 2 and 3 thousands of an inch or the thickness of 2 or 3 human hairs (296a, 297a).

The Court was keenly aware of the technicalities involved and paid close attention to the evidence during the



eight days of trial. It frequently sought clarification of testimony from the witnesses and engaged in colloquy frequently with counsel for the parties so as to understand the issue and follow the proof as it developed.

The Court took extensive notes and on several occasions requested the court reporter to read back the testimony.

In view of the lengthy proceedings and while the evidence was still fresh in its mind, the trier of the facts deemed it advisable "... to take advantage of the thought given ... [the case] ... in the last few days ..." and dictated its findings of fact and conclusions of law (582a, 583a).

This appeal is directed solely to the trial court's determination of the facts and a claim that reversible error was committed in disregarding or misunderstanding Hellenic's evidence

### **Appellant's Contentions**

The thrust of Hellenic's appeal is that the trial court disregarded "physical evidence" of the condition of the crankshaft; that the trial court misconstrued the importance of web deflection readings; and that the trial court did not find "latent defect" as the cause of loss, all of which constitute reversible error (Appellant's Brief pp. 2, 3).

### **POINT I**

#### **There is no question of law on this appeal**

Hellenic makes reference to the trial court's holding that since New York was the HELLENIC SAILOR's home port, the voyage was effectively interrupted at New York in consequence of which Hellenic was required to exercise due diligence at New York to make the vessel seaworthy as to all cargo whether it was loaded at New York or earlier at other United States ports. (Appellant's Brief pp. 18, 19).

The Court cited as authority *The Isis*, 290 U.S. 333 (1933). *Carver, Carriage By Sea*, 2 British Shipping Laws, 12th Ed. discusses the problem of when due diligence should be exercised in the case of a ship on a round voyage and concludes that the place reasonably to be expected is the vessel's home port (Sec. 264). Hellenic does not dispute, and the record amply demonstrates, that at Hellenic's home Port of New York and before commencement of the transocean voyage, Charles Allan, its marine superintendent (125a, 127a) who was responsible only to Mr. Callimanopulos, its general manager (610a) boarded the HELLENIC SAILOR for the purpose of attending to the vessel's needs (222a, 266a, 636a, 637a). He had previously expressed some concern over an alignment reading taken of the vessel's crankshaft (Pl. Ex. 26). Hellenic's present marine superintendent, Harry Petsis (127a) also visited the vessel when she was at New York on the dates November 14 to 18, 1967 (181a, 182a). The presence of Messrs. Allan and Petsis amply demonstrates that at New York, Hellenic assumed control of its vessel and supports the trial court's finding that the voyage was effectively interrupted.

It is cargo's contention that the question of intervention of Hellenic at New York in 1967 is moot because, as will be shown, the proof offered at the trial overwhelmingly supports a determination that Hellenic was remiss in attending to the seaworthiness of the HELLENIC SAILOR long before the voyage which is the subject of this litigation commenced.

## POINT II

Hellenic has failed to demonstrate that the findings of the trial court were "clearly erroneous" as to require reversal by this court.

In cases such as the matters on appeal here, in which the trial court sits without a jury and makes findings of



fact, it is well established in the law that those findings of fact will not be set aside on appeal unless they are *clearly erroneous*, Federal Rules of Civil Procedure 52(a), 28 U.S.C. The Supreme Court has held that a finding is "clearly erroneous" only if the reviewing court *on the entire evidence* is left with the *definite and firm conviction* that a mistake has been committed. *United States v. United States Gypsum Co.*, 333 U.S. 364, 395 (1947). The application of the standard by the appellate court is not without limits:

"In applying the clearly erroneous standard to the findings of a district court sitting without a jury, appellate courts must constantly have in mind that their function is not to decide factual issues *de novo*. The authority of an appellate court, when reviewing the findings of a judge as well as those of a jury, is circumscribed by the deference it must give to decisions of the trier of the fact, who is usually in a superior position to appraise and weigh the evidence. The question for the appellate court under Rule 52 (a) is not whether it would have made the findings the trial court did, but whether "on the entire evidence (it) is left with the definite and firm conviction that a mistake has been committed."

*Zenith Radio Corp. v. Hazeltine Research, Inc.* 395 U.S. 100, 123 (1969).

The standard clearly applies to the judgment of a trial court sitting without a jury in admiralty. *McAllister v. United States*, 348 U.S. 19 (1954). It is for this Court to determine in this instance, therefore, whether the trial court's findings of fact were clearly erroneous; if not, appeal must fail, since no issues of law are raised in appellant's brief (Point I *supra*).

Hellenic contends that the trial court ignored or misconstrued testimony in its favor with respect to the necessity of taking web deflection readings on the crankshaft of the HELLENIC SAILOR, and gave undue weight to Mr. Allan's apparent concern regarding the shaft alignment as expressed in his letter of November 6, 1967 (Pl. Ex. 26). It is not for this Court, however, to pass upon the weight given (or not given) by the lower court to testimony offered at trial, since the trier of fact is usually in a better position than the appellate court to appraise and weigh the evidence. *Zenith Radio Corp. v. Hazeltine Research Inc.*, *supra*, 123. Even if this Court disagrees with the conclusions of the trial judge, such disagreement alone is not enough to require that the findings be set aside. *B's Company, Inc. v. B. P. Barber & Associates, Inc.*, 391 F. 2d 130 (4 Cir. 1968).

Even if the weight of the evidence is not clearly in favor of cargo, this Court cannot overturn the decision of the trial court on that ground alone. In *United States v. Yellow Cab Co., et al.*, 338 U.S. 338 (1949), the Supreme Court said at page 342:

"While, of course, it would be our duty to correct clear error, even in findings of fact, the Government has failed to establish any greater grievance here than it might have in any case where the evidence would support a conclusion either way but where the trial court has decided it to weigh more heavily for the defendants. Such a choice between two permissible views of the weight of evidence is not 'clearly erroneous.' "

The standard also applies to inferences drawn from documents or undisputed facts. *United States v. United States Gypsum Co.*, *supra*, 394. In *McAllister v. United*

*States, supra*, in which the Supreme Court upheld a judgment of the trial court finding the United States liable to plaintiff for damages incurred as a result of contracting polio while on board ship, the trial judge found that the plaintiff had been exposed to the disease when the master of his ship had permitted residents of a city in which there was a polio epidemic to board the vessel in performance of stevedoring services. At 348 U.S. 22, 23, the Court said:

"Of course no one can say with certainty that the Chinese were the carriers of the polio virus and that they communicated it to the petitioner. *But upon balance of the probabilities it seems a reasonable inference for the District Court to make from the facts provided*, supported as they were by the best judgment medical experts have upon the subject today, that petitioner was contaminated by the Chinese who came aboard the ship November 11, 1945, at Shanghai. Certainly we cannot say on review that a judgment based upon such evidence is clearly erroneous." (Emphasis supplied)

It is also well-established that the weight to be given expert testimony is solely within the discretion of the trial judge, and his findings thereon will not be set aside by an appellate court unless they are clearly erroneous within the meaning of the standard. *Transcontinental Gas Pipe Line Corp. v. Hackensack Meadowlands Development Commission*, 464 F. 2d 1358, 1364 (3 Cir. 1972). Clearly, the trial court considered the expert testimony of Messrs. Bates, Smith and Haugestad; but it is not for this Court to inquire as to the relative weight given to that testimony, or to question the foundation for such reliance.



## POINT III

The crankshaft alignment on the voyage was unsatisfactory and this condition was known to Hellenic.

The trial record is replete with references to the fact that an important rule of thumb in determining whether the alignment of a crankshaft in a vessel such as the HELL-ENIC SAILOR is satisfactory, is that when the ship is in ballast or lightly loaded the crankshaft is expected to have a sag and when loaded or substantially loaded it is expected to have a hog. (Hellenic's Marine Superintendent Petsis—188a, 189a, 191a, 192a; Hellenic's Then Chief Engineer and Present Port Engineer in Piraeus Evangelou—245a, 735a, 747a, 748a; Hellenic's Expert Haugestad—445a; Hellenic's Marine Superintendent Allan—611a, 622a, 629a, 630a, 632a, 662a, 663a, 673a, 682a, 683a).

According to Evangelou, the mean draft of the HELL-ENIC SAILOR in ballast (empty) is 13 ft. (245a) and when loaded it is 29 ft. (245).<sup>1</sup>

The following exhibits showing crankshaft alignment and vessel draft calculations from the time of reconditioning the main engine crankshaft bearings in the fall of 1962 to the date of the casualty were received in evidence:

Date	Draft		Main Bearings			
	Fwd.	Aft	No. 4	No. 3	No. 2	
11/20/63	27'3"	27'7"	+0.003	-.007	+0.002	(Def. Ex. L)
9/8/64	16'3"	19'6"	-.012	-.008	-.008	(Def. Ex. M)
2/1/66	10'10"	22'8"	-.024	-.038	-.017	(Def. Ex. N)
8/2/66	14'3"	25'0"	-.014	-.016	-.011	(Def. Ex. P)
10/11/67	12'6"	22'10"	-.032	-.042	-.032	(Pl. Ex. 23)

<sup>1</sup> The mean draft in ballast may actually be 13 ft. 6 in. (Def. Ex. Q—showing draft after completion of repairs at Bombay 8/16/68) but the difference in proof is of little consequence.

One other reading taken on February 3, 1968 (Pl. Ex. 36; Pl. Ex. 35) showed the following crankshaft alignment and vessel's draft calculation after the casualty:<sup>2</sup>

<u>Date</u>	<u>Fwd.</u>	<u>Aft</u>	<u>No. 4</u>	<u>No. 3</u>	<u>No. 2</u>
2/3/68	24'00"	29'00"	-.016	-.026	-.017

Defendant's expert, Bates, testified that the alignment readings (Def. Ex. AL) showed the trend of a greater and greater sag and that this trend should have been sufficient to cause concern (339a; opinion 600a). Regardless of Bates' opinion, however, it should be noted that the post 1962 repair alignment readings with the vessel in various conditions of draft indicated in the main that the crankshaft was running in a continuously sagged condition. This evidence alone supports a finding that the vessel's crankshaft was lying in a position which was generally inconsistent with its expected alignment *i.e.*, either hogged or sagged, depending upon the vessel's cargo load. This evidence alone also supports a finding that Hellenic should have monitored other data pertaining to the shaft condition, such as web deflection tests (Bates—399a) in order to get a more accurate view of the crankshaft's condition.

There was substantial testimony in the lower court which supports cargo's further argument that the Hellenic's practices in taking crankshaft alignment readings were far from adequate.

<sup>2</sup> There was disputed testimony concerning the reliability of this reading which was taken after the fracture. Haugestad thought it was indicative of pre-fracture alignment (440a, 441a). Allan considered it unreliable because after the fracture the shaft would be lying in a different position (665a, 656a). Evangelou reluctantly admitted that it was taken after some 15 tons consisting of the weight of the piston and connecting rods were removed from the shaft (252a-259a), an event which must have altered the alignment as it was before the fracture when the piston and rods were connected. The lower court rejected Haugestad's opinion (595a).

Hellenic's witness, Golten, acknowledged that the vessel's draft affects crankshaft alignment (319a) although he did say that the October 11, 1967 reading was a "dream reading"<sup>3</sup> (Pl. Ex. 23; 288a, 290a). He reluctantly agreed, however, that since the ship at that time was in a light condition, the reading would be more meaningful if shortly thereafter crankshaft alignment was measured with the ship in a loaded condition (320a, 321a). Allan said that a 3 ft. draft differential forward and aft affected the reliability of a crankshaft alignment reading (682a; see also 713a). Evangelou was of the same opinion (745a). The four alignment readings immediately preceding the casualty indicated draft differentials of approximately 10 ft., 9 ft., 12 ft., and 3½ ft., respectively (Pl. Ex. 23; Def. Ex. P; Def. Ex. N; Def. Ex. M). The post casualty alignment reading, which the trial court found to be unreliable in any event, indicated a 5 ft. draft differential (Pl. Ex. 36; Pl. Ex. 35). Thus, the five most recent crankshaft alignment readings were taken under vessel draft conditions which made them unreliable.

Allan also testified that more reliable readings, ones which would be indicative of what might be required for

<sup>3</sup> It is apparent that this so-called "dream reading" was actually a reference to the symmetry of the reading rather than to the extent of desirable sag. A clue to his view of the October 11, 1967 reading can be found in certain of his answers when he was questioned about his reasons for criticizing a hypothetical dog-leg sag of .032 in. at No. 4 main bearing, .022 in. at No. 3 main bearing and .032 in. at No. 2. At 291a, he said, "You would have a worse shaft condition than you have now." At 292a, he said, "you would have a much, much worse situation than this here . . ." On each occasion he was referring to the October 11 reading (Pl. Ex. 23). At 311a, when asked why he would prefer a maximum sag of .022 in. to a maximum sag of .042 in., he explained that it was preferable to use .022 in. because you would thereby reduce the sag. In essence, then, the witness was saying that where the sag could be reduced in this manner and retain its symmetry, it would be preferable.



correction, could be obtained if the alignment was first taken with the vessel in a light condition and then thereafter taken with the vessel in a loaded condition (683a, 684a). The trial record does not reflect that this was done. He also said that knowledge of the placement of the cargo in the vessel would be helpful in determining the reliability of crankshaft alignment readings (685a, 686a, 721a), yet at the times that Golten took such readings (i.e., the five under discussion) they did not know of the cargo's disposition (722a). Allan acknowledged, too, that it was unfortunate that no alignment readings were taken with the vessel in a completely ballasted condition since if this were done one would be able to determine how much sag to put in the bearings (685a). He had never even seen the HELLENIC SAILOR in a full ballast condition, ostensibly for the reason that the ship is there to make money (686a).

The lower court's determination that Hellenic failed to exercise due diligence to make its vessel seaworthy is further supported by this uncontroverted evidence of Hellenic's witnesses.

The trial court commented at length concerning Hellenic's failure to offer direct evidence of the alignment of the HELLENIC SAILOR's crankshaft at about the time it departed on the voyage from New York. On November 6, 1967, after reviewing the October 11 readings (Pl. Ex. 23) Allan, who was in charge of engineering and made all the big decisions, (129a) wrote the following letter to the HELLENIC SAILOR's Chief Engineer Evangelou (Pl. Ex. 26);

"Enclosed herewith please find your file copy of Pilgrim wire readings as taken while your ship was at our port. Please note the position of the crankshaft with Nos. 2, 3 and 4 below the zero line. It is important to observe ship's draft while the readings

were taken, and with 12 feet 6 inches forward, the ship would be in a comparatively light condition, causing the deflection to be below the zero line, although the figures show an excess [excess] over the desirable measurements. We will take further readings at the next available opportunity with the ship in both loaded and light condition."

In its opinion the trial court held that Allan's letter indicated a judgment on his part "that the October 11th readings were a cause for concern from an operational standpoint." (598a) Allan's testimony that a sag of .046 in. was wisely corrected by the vessel owner at an early date is indicative of his concern about a .042 in. sag (678a).

Evangelou understood the letter to mean that he should take an alignment measurement with the vessel in a loaded condition (221a, 244a, 245a, 247a). He testified that pursuant to Allan's instructions he took a reading at Philadelphia (Paulsboro) on November 13, 1967 (Pl. Ex. 25) at a time when the vessel was about 80% full and that for alignment purposes he considered the vessel to be full (219a, 220a, 244a, 247a). The reading was not dated. He said that this was the first time he had taken such an alignment reading (239a, 240a). When questioned concerning the marked similarity of the alleged Philadelphia reading (Pl. Ex. 25) and another reading taken after the casualty at Port Sudan on February 23, 1968 (Def. Ex. A), he said that it was "coincidence" (250a, 251a). The trial court rejected Evangelou's testimony that the exhibit was prepared by him in Philadelphia after it was discovered by the court that the original exhibit 25 had markings on it which suggested that Evangelou had earlier recorded numerous crankshaft alignment readings on the same yellow pad from which exhibit 25 was made (261a-264a, 267a-271a). At that juncture and again subsequently,



Hellenic's counsel stated that he would not rely on exhibit 25 to prove the exercise of due diligence (271a, 273a, 422a). At one point in the trial he acknowledged that exhibit 25 could not be the Philadelphia reading although Evangelou testified under oath that it was (424a, 425a).

Since the document produced by the witness who claimed to have made the alignment reading had been discredited, it is conceivable that Mr. Allan's instructions were ignored and that no measurements were taken. Assuming that Evangelou actually took such a reading, Hellenic made no attempt to explain its failure to produce the true record. Accordingly, the court is free to draw an inference that the document is unfavorable to its position in this case. *Tupman Thurlow Co. Inc., v. S.S. Cap Castillo*, 490 F. 2d 302, 308 (2 Cir. 1974); *The Penelope*, 354 F. 2d 577, 582 (7 Cir. 1966) where evidence concerning customary testing was offered in lieu of the record of the actual testing done on the equipment involved; see also *The Mincio*, 1936 AMC 1765, 1771 (S.D.N.Y. 1936); *Richardson on Evidence* (9th Ed.) Sec. 92; *Wigmore on Evidence* (3rd Ed.) Secs. 285, 291. In any event, and in view of Allan's direction that alignment readings be taken, the absence of such readings supports the trial court's finding that Hellenic failed to exercise due diligence to make its vessel seaworthy in violation of the duty imposed upon it by COGSA 46 U.S.C. 1303(1).

Recognizing its predicament, Hellenic sought to prove through Haugestad that the February 3 post casualty reading (Pl. Ex. 35) was satisfactory and indicative of a satisfactory crankshaft condition before the vessel departed from New York. The court rejected his testimony and accepted the testimony of Allan (FN 2 *supra*) that the reading was of no significance. Hellenic contends that this was error, because as of February 3 the crack had been closed

by Van Cooten (Appellant's Brief p. 36). It explains that in answering a question posed by the trial court Haugestad forgot that the shaft had been repaired. If he did forget, and the repair was significant in rendering his opinion, he had then no basis for concluding that the February 3 reading was within a few thousands of an inch of the New York alignment before the fracture. However, neither the fracture nor the repair was of consequence to him because when asked if anything might have happened to the HELLENIC SAILOR's crankshaft between the October 11 and February 3 readings to adversely affect the crankshaft he answered: "I can't see what could have happened" (442a). There was a conflict between Haugestad and Allan. The latter, although not called at the trial by Hellenic, was advertised to the court as its second principal witness (125a). At another point in the proceedings, the court was advised that Allan would be produced and that Hellenic would not rely on his deposition (368a, 369a). No reason was advanced for his not being called except that Hellenic's counsel did say: "We have concluded that no useful purpose would be served in calling Mr. Allen [sic] in his present condition to explain away that letter. We feel that his testimony and the letter speak for themselves." (422a).

As noted Haugestad stated that his February 3, 1968 readings were within a few thousands of an inch of actual crankshaft alignment when the vessel departed New York (440a, 441a). If he was correct, then at New York, at a time when the vessel had a mean draft of 28 ft. 7in. (229a, 230a—26 ft. 2 in. forward and 31 ft. 0 in. aft) the vessel, although substantially loaded, had an appreciable sag in its crankshaft. Yet, according to Allan, Evangelou, Petsis and Haugestad (p. 8 *supra*) this draft condition would normally be expected to produce a hogged crankshaft. In

addition, the draft differential at New York and at Port Sudan was 4 ft. 8 in. and 5 ft. respectively, conditions which according to Allan and Evangelou make crankshaft alignment readings unreliable (p. 10 *supra*). The trial court, therefore, had every reason to reject Haugestad's testimony. Notwithstanding his extensive experience with marine engines, it is cargo's position that Haugestad's standing to express an opinion concerning the suitability of crankshaft alignment in a Doxford engine is at issue especially in view of his testimony concerning Doxford crankshafts and web deflections which is discussed at pp. 18, 19 *infra*.

The trial court noted that there appeared to be no set standards for maximum hog or sag in Doxford crankshafts, but that it "... was a matter for the sound judgment of the people responsible for the vessel." (596a, 597a) Petsis was of the same view (195a, 196a, 197a). It is interesting to note that in spite of all the testimony concerning "dream readings" when the relatively light vessel had a sag of up to .042 in., upon completion of the repairs at Bombay and with the vessel in an even lighter condition, the crankshaft had a sag of .003 in. at bearing No. 4, .004 in. at bearing No. 3 and .004 in. at bearing No. 2 (Def. Ex. Q).<sup>4</sup> Thus, the post fracture sag was reduced tenfold. Another indication of the desirable crankshaft deflection can be found in the readings taken after repairs at Piraeus in September 1962 when the vessel with a draft of 24 ft. forward and 26 ft. aft had a hog in its crankshaft of .012 in. at bearing No. 4, .011 in. at bearing No. 3 and .006 in. at bearing No. 2 (Def. Ex. E—pp. 1, 2 and 5).

<sup>4</sup> Hellenic's expert, Smith, on his direct examination testified that when the manufacturer would install a new engine in a vessel afloat he would strive for a sag in the crankshaft of within .004 in. or .005 in. of true because at such times the vessel would be light (336a, 337a).



As further evidence of the satisfactory condition of the HELLENIC SAILOR's crankshaft, Hellenic in its Brief at page 37 states:

"Wire gauge readings show how the crankshaft is lying in the bearings, and if the sag is excessive or if the readings show a dog-leg, *the readings would reveal whether the crankshaft required realignment which would be accomplished by remetalling the bearings*" [emphasis supplied].

Continuing:

"From November, 1962 when new bearings were flown to Port Sudan and installed in the HELLENIC SAILOR, through February, 1968 when she was again at Port Sudan, the wire gauge readings taken by Golten Marine all showed satisfactory crankshaft alignment and that *no remetalling of the bearings was necessary.*" [emphasis supplied].

It is significant that the repairs to the crankshaft made at Bombay after the casualty included remetalling of the Nos. 2 and 4 main bearings and the machining of the No. 3 main bearing (Pl. Ex. 31—General Average Statement p. 37). No evidence was offered by Hellenic to explain why this was necessary. Evangelou said that the way to correct alignment would be to remetal the bearings (210a, 211a). It is evident, that this work on the main engine bearings was indispensable in order to bring the vessel's crankshaft from its pre-fracture maximum sag alignment .042 in. to its post fracture maximum sag alignment of .004 in. The need for changing the bearings' thicknesses by remetalling Nos. 2 and 4 and machining No. 3 is overwhelming proof that before the casualty Hellenic knew that the vessel's crankshaft was not lying in a desirable alignment even taking into account the vessel's draft.

#### POINT IV

**The absence of recent crankshaft deflection readings is proof of Hellenic's failure to use due diligence to make the Hellenic Sailor seaworthy with respect to its crankshaft.**

Bates was of the opinion that since the records of wire alignment readings from November 13, 1963 to October 11, 1967 disclosed the trend of a continually increasing sag, it would have been prudent for Hellenic to take crank web deflection readings when it learned of the October 11 results (394a). In its appeal brief, Hellenic does not quarrel with Bates' observation of the trend but it disagrees with his opinion that the trend should have prompted the taking of crank web deflection readings (p. 37). This view has to be based upon an assumption that wire gauge readings tell all there is to know about stress in a crankshaft. Allan testified in his deposition that web deflection readings were "essential" (719a). They are essential because if deflection is too great they would cause the crankshaft to be subjected to additional stress during its rotation (726a). Petsis testified that you could not tell crank web deflections by studying an alignment reading (194a). Haugestad was of the same opinion (450a, 451a). Golten said he could if given two hours (306a). When he was asked by cargo counsel how he would go about figuring it out, the trial court commented: "Now, if it is important, the fact that it wasn't done is the critical thing." (306a).

Smith's testimony concerning web deflections was confusing to say the least in that he frequently referred to a tolerance of .125 in. which at times was related to wear down of main bearings (328a, 330a, 335a, 339a, 346a, 355a, 356a); at times related to web deflections (328a, 329a, 335a, 361a-363a, 369a, 370a); and at times related to crank-

shaft alignment (346a-353a, 357a, 358a). The court ultimately cleared up the confusion and Smith agreed that the .125 in. figure referred to wear down (381a, 382a).

Haugestad was not concerned about web deflection on Doxford engines (430a). He would not bother taking web deflection readings on such engines because in view of their design they would differ from engine to engine (430a, 431a); yet he subsequently acknowledged that it would be helpful to have the engine manufacturer's recommended web deflections as a guide in the course of taking crankshaft alignment readings (451a).

The trial court was free to give little weight to the testimony of Haugestad *vis-a-vis* Doxford engines and web deflection readings, for Sun had in fact published recommended maximum web deflections for the HELLENIC SAILOR as far back as 1959 (Def. Ex. K). In October of 1960 British Doxford, in commenting upon the special characteristics of the Doxford engines cautioned that "[t]he records taken when the engine was first erected in the Enginebuilders Shop should therefore be regarded as a basis when considering actual figures obtained from a ship in service." They concluded: "In general, bearing in mind the variations mentioned above, deflection readings should not go beyond the limits .005 inches and .035 inches. . . ." (Pl. Ex. 32, Sheet No. 7). In November of 1960, Hellenic Lines measured crankshaft deflection of the HELLENIC SAILOR after the main engine bearings were reconditioned. The deflection was generally in excess of that recommended by Sun (Def. Ex. V, p. 2). Hellenic Lines again measured crankshaft deflection of the vessel after the main engine was repaired at Piraeus in September of 1962 (Def. Ex. E, p. 4). The readings are shown in millimeters but they were converted to inches at the request of the court (Def. Ex. AL). These figures are also slightly in excess of those rec-



ommended by Sun. In May of 1964 British Doxford emphasized the need for crankshaft web deflection readings and compiled extensive notes and data from which one "... can calculate stresses in the crankshaft corresponding to a set of deflection readings." (Pl. Ex. 33). It is difficult to conceive how Haugestad who claimed to be a Doxford engine expert could express the view that crankshaft web deflections are of no particular value when it comes to the care and maintenance of a Doxford engine, be it Sun built or British built.<sup>5</sup>

The record is replete with other instances of the ignorance of Hellenic's personnel regarding crank web deflections and Doxford engines. Petsis claimed that British and Sun had told Hellenic to ignore deflection readings on their Dofords (160a). He did not know how to take a web deflection reading for he said that the distance between the webs to be measured was between 8 and 10 feet (159a, 161a). When questioned on this point by the court he said you would measure it between the two small webs and then he changed it to between the larger webs (160a). He finally acknowledged that he was not sure if deflection was measured between the big webs (161a). Golten, whose company measured web deflections on engines other than Dofords every day of the year except Christmas (276a), correctly described the procedure as a measurement between the main webs of the particular crank (303a). The distance is not 8 ft. as described by Petsis (306a). Golten, however, had never checked the deflection on a Doxford engine (302a).

The trial court concluded that the evidence of Hellenic and cargo regarding the cause of the fracture in the side

<sup>5</sup> It should be noted that Golten Marine serviced Hellenic's British and Sun Dofords (457a). The British vessels were purchased by the company in 1956 (722a-724a).

web warranted a finding that it developed as the result of a fatigue crack occurring over some unknown period of time, which was followed by a sudden rupture of the side web at the time of the casualty (589a, 590a).

Cargo's expert Bates testified that the flexing of the main webs during rotation of the crankshaft would impart certain stresses to the side webs (402a, 407a, 408a). Excess main web deflection would impart a greater stress in the side web because the greater bending moment is there (403a). In his opinion excess main web deflection in the main webs at the No. 2 crank could have caused the fracture in the after side web on the No. 3 main journal (403a, 404a). This opinion was not contradicted by any of Hellenic's witnesses or other evidence. Haugestad agreed that the greater the sag or hog, the greater the web deflection, and that putting the shaft into alignment tends to minimize excess stress which comes about as the result of deflection. (451a). Golten's testimony that a .125 in. crank web deflection would certainly reduce the life of the crankshaft (307a, 308a) can be reasonably interpreted to mean that excess web deflection can cause a web to fracture.

Hellenic seeks to eliminate excess web deflection as a possible cause of the fracture by testimony that the crankshaft's alignment was satisfactory. This contention was rejected by the trial court, to wit: "The question obviously arises, why should not web deflection be measured directly rather than have it calculated from another measurement, namely, crankshaft alignment?" (603a). Bates testified that crank web deflection is a direct reading of the bending stress in the main crank web and in the side web (402a). The suitability of alignment readings alone for the determination of crank web deflections would obviate the need for Doxford engine manufacturers to publish tolerances and



specific instructions regarding crank web deflections (Def. Ex. K; Pl. Ex. 33; Pl. Ex. 32). If a satisfactory alignment reading was the sole criteria for determining the web deflection why did Hellenic measure web deflection of the vessel's crankshaft after repairs in Genoa in 1960 (Def. Ex. V), and after repairs in Piraeus in 1962 (Def. Ex. E, p. 4)? Indeed, why did Allan say they were "essential" (719a) and that they were measured on almost every voyage by the chief engineer (719a, 647a)? Why did Haugestad concede that manufacturer's tolerances would be helpful as a guide in the course of taking alignment readings (415a)? The conclusion that one must draw is that they are most meaningful in determining whether, in spite of tolerable shaft alignment, the webs themselves are under excessive stress.

The trial court noted Hellenic's failure to produce web deflection readings for the period commencing after the 1962 repairs to the date of the casualty. Its determination that on that account also Hellenic's complaints should be dismissed is founded upon a preponderance of the evidence and should not be disturbed on this appeal.

#### POINT V

**The question of inherent vice is not relevant to the issues on this appeal.**

There was no evidence that the fracture of the after side web was caused by inherent vice nor did the trial court attribute the fracture to this cause. Hellenic postulates its "inherent defect" argument on its contention that it exercised due diligence in respect of the crankshaft at and before the beginning of the voyage (Appellant's Brief p. 43). The argument is moot, however, since if in spite of Hellenic's exercise of due diligence to make the crankshaft seaworthy it fractured, it would be of no consequence if it were caused by inherent defect or some other cause not discoverable by the exercise of due diligence, for in either

case Hellenic would be entitled to general average contributions. The issue here is not the cause of the fracture, but whether Hellenic exercised due diligence to make the crankshaft seaworthy at the beginning of the voyage. The trial court concluded that it had not.

### CONCLUSION

The judgment of the District Court dismissing Hellenic's complaints should be affirmed.

Respectfully submitted,

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*Brief* IS HEREBY ADMITTED

THIS 27<sup>th</sup> DAY OF May 1945

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